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Supplement 1

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Maintenance

SELECTIVE MANAGEMENT OF SELECTED GAS TURBINE ENGINES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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(Lt Col Donald R. Richardson)
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This instruction implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*. It directs the management of selected gas turbine engines identified in TO 00-25-254-1. It describes the propulsion management responsibilities required to manage Air Force engines. The Air Force specially manages selected gas turbine engines (hereafter referred to as "engines") as principal items, as defined by Department of Defense Instruction (DoDI) 4140.60, *DoD Materiel Managemen*t, January 5, 1993. In the DoDI certain items are so important that they require special centralized management, including inventory control, computation of requirements, distribution, and information. The justification includes safety and reliability considerations, impact on the successful mission completion, limited available assets, and high acquisition and logistic support costs. The Air Force serially manages and controls engines for their lifetimes. Another special characteristic of engines is that the Air Force acquires most under the "Life-of-Type Buy" concept (see DoDI 4140.60), which means that reprocurement of engines after the acquisition program has ended is generally not economically feasible. Thus, only a finite quantity of engines is available to support the aircraft in which they are installed for their operational life.

(AFMC) This supplement does not apply to the Air National Guard (ANG) or US Air Force Reserve (USAFR) units and members. This supplement implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*, and AFI 21-104, *Special Management of Selected Gas Turbine Engines*. It expands on the guidance provided in AFI 21-104 and only pertains to organizations within AFMC. Units may further supplement this instruction and Command supplement, as required.

SUMMARY OF REVISIONS

This is the first publication of this AFI. It implements AFPD 21-1; supersedes AFR 400-1, volumes I and III; and obsoletes AF Forms 811, 2141, 2161, 2171, and DD Forms 1802, 1803, and 1803-1. Though

detailed information has been removed, authorities and responsibilities remain unchanged in this document.

(AFMC) This supplement supersedes AFR 400-1/AFMCS 1, 9 Sep 91.

AFI 21-104, 17 Jun 94, is supplemented as follows:

1. Who Does What in Engine Management. Managing selected engines requires direction and policy from HQ USAF to the major commands (MAJCOM), the Propulsion Product Group Manager (PGM), and the respective engine managers at base level. The Engine Advisory Group (EAG), Propulsion Management Committee (PMC), Maintenance Planning Group (MPG), Engine Review Organization (ERO), and Comprehensive Engine Management System (CEMS) Functional Review Board (FRB) help these organizations in management and policy decisions.

2. Those Involved in Special Engine Management:

2.1. HQ USAF:

2.1.1. HQ USAF/LGM:

- Provides engine management policy and directives for in service engines not in procurement.
- Provides policy to develop logistics plans to implement approved mobility operational concepts and objectives.
- Approves maintenance concepts and management policies to support engine requirements and stock levels.

2.1.2. HQ USAF/LGS:

- Approves funding requirements for depot level repair of Air Force engines.

2.1.3. HQ USAF/XOX:

- Sends MSC/SMW latest version of the Revised Daily Answer Tape (RDAT) by 1 March of each year. Formats according to the memorandum of agreement (MOA) between War Mobilization Plan (WMP) 3&5 and D087P.
- Sends MAJCOMs LGMs, SA-ALC/LR/LP, OC-ALC/LP and ASC/SM hard copies of the RDAT by 1 March of each year. If RDAT is unavailable in time for annual computations, notifies the MAJCOMs and engine centers what war documents to use.

2.1.4. HQ USAF/PED:

- Sends MSC/SMW latest version of both the *USAF Program Aerospace Vehicle Flying Hours/Missiles* (PA) and the *USAF Program Installation Units and Priorities* (PD) tapes by 1 March of each year. Formats according to the MOA between K002 (PA) and D087P.
- Sends all MAJCOM LGMs, SA-ALC/LR/LP, OC-ALC/LP and ASC/SM copies of the latest version of both the PA and PD by 1 March of each year. If the RDAT is unavailable in time to compute annual whole engine stock levels, repair requirements and retention requirements, tells the MAJCOMs and engine centers what peace documents to use for annual computations.

2.2. MAJCOMs:

- Recommend improved logistic concepts, policies, and procedures for engines to HQ USAF/LGM.
- Oversee Stock Record Account Number (SRAN) engine operations and appoint an engine manager (EM) at each MAJCOM, Air Logistics Center (ALC) and base-level SRAN.
- Redistribute command owned engines as required.
- Include engine plans in mobility planning directives, operating procedures, and logistics annexes and appendices.
- Supply data identified by the Propulsion PGM to compute worldwide stock-level requirements.
- Uses Air Force planning documents to provide data so Propulsion PGM can compute requirements.
- Compute MAJCOM base stock-level requirements.
- Forecast engine depot repair requirements before periodic negotiations.
- With the Propulsion PGM, determine air-breathing drone engine unit-stock levels.
- Obtain the Propulsion PGM concurrence when making specific engine transfers between the Air Force and other services, security assistance programs, government agencies, and non-government organizations.
- Make all required POM inputs for DPEM funds.
- Are responsible for budgeting and allocating O&M funds used to purchase depot-level reparable items from RSD.

2.2. (AFMC) Headquarters Responsibilities:

2.2.1. (Added-AFMC) HQ AFMC/DRC.

- Headquarters focal point and advocate for the Propulsion Product Group Manager (PPGM).
- Establishes objectives, plans and programs to assure continuous product/process improvement and logistics support.

2.2.2. (Added-AFMC) HQ AFMC/XP Responsibilities: Assigns the engine, by type and model (TM), to an air logistics center (ALC) for depot maintenance. Assignments are published in TO 00-25-115.

2.2.3. (Added-AFMC) HQ AFMC/LGM Responsibilities:

- Recommend improved logistic concepts, policies and procedures for engines to HQ USAF/LGM.
- Oversee stock record account number (SRAN) engine operations and ensures a qualified engine manager (EM) is appointed at each Test Center.
- Redistribute command owned engines as required.
- Supply data identified by the PPGM to compute worldwide stock-level requirements.
- Uses Air Force Planning documents to provide data so PPGM can compute requirements.
- Compute AFMC base stock-level requirements.

- Forecast engine depot repair requirements before periodic negotiations.
- Obtain the PPGM concurrence when making specific engine transfers between the Air Force and other services, security assistance programs, government agencies, and non-government agencies.
- Make all program objective memorandum (POM) inputs for depot purchased equipment maintenance (DPEM) funds.

2.2.4. (Added-AFMC) HQ AFMC/LGP Responsibilities:

- Recommend improved maintenance concepts, policies and procedures for engines to HQ USAF/LGM.
- Obtain the PPGM concurrence when making specific engine transfers between the Air Force and other services, security assistance programs, government agencies, and non-government agencies.

2.3. SRAN Engine Manager:

- Executes engine management policy and procedures. Develops MOA with SRANs at propositioned sites to manage engines. Also manages tenant spare engines according to AFI 25-201, *Support Agreements Requirements*, (formerly AFR 11-4).
- Develops local engine management procedures to report and handle accountable engines and nonaccountable items.
- Tracks accountable engines in the SRAN subaccount according to TO 00-25-254-1.
- Is accountable for a shipped engine until the receiver acknowledges receipt in CEMS.
- Prepares engine against corrosion, shock, and vibration damage during transportation, handling and storage .
- Prepares DD Form 1348-1, **DoD Single Line Item Release/Receipt Document** or DD Form 1348-1A, **Issue Release/Receipt Document,** for all engine shipments and transfers.

2.3. (AFMC) AFMC SRAN EM. Each AFMC base with operational units or engine repair facilities shall assign a SRAN EM and assistant. The SRAN EMs may supplement this regulation.

2.3.1. (Added-AFMC) The SRAN EM manages the SRAN's prepositioned engines at all locations, but is not responsible for another SRAN's prepositioned engines at the SRAN EM's facility.

2.3.2. (Added-AFMC) Makes sure Comprehensive Engine Management System (CEMS) reporting personnel are properly trained for reporting procedures and all training documented.

2.3.3. (Added-AFMC) ALC SRAN EM Responsibilities:

- Receiving, tracking physical location of induction engines into maintenance, receipt from maintenance, and shipping all engines from the engine ALC.
- Distributes engines according to the Engine Item Manager’s (or Command Engine Manager’s) instructions.
- Inducts reparable engines into the depot repair facility except for training, school or those held as materiel deficiency report (MDR) exhibits engines.
- Ensures correct shipping documents accompany an engine to the shipping activity. 2.3.3.1. All ALCs Additional SRAN Responsibilities. Reports the receipt and transfer of

engines in all modification (MOD), program directed maintenance (PDM) and test aircraft unless a memorandum of agreement (MOA) with specific reporting instructions exists. If replacement of an engine is required on a MOD, PDM, or test aircraft, coordinates requirement with the owning SRAN and command EM.

2.4. Propulsion PGM: *(As Appropriate, The PGM May Delegate PGM Responsibilities to Subordinate Organizations):*

- Is the single face to the user and other external organizations for propulsion activities and issues (see **Attachment 2**, **Figure A2.1.**).
- Supplies inputs to R&D for new engine technologies.
- Represents the Air Force on all joint service propulsion committees such as the Joint Propulsion Coordinating Committee (JPCC).
- Supports the aircraft Systems Program Director (SPD) in determining Quick Engine Change (QEC) kit requirements.
- Develops warranties in conjunction with the using commands, and other government agencies according to AFI 64-104, *Weapon Systems Warranties* (formerly AFR 70-11).
- Manages engines for their life-cycle.
- Manages engine inventory world wide, and supports authorized engine stock levels for each SRAN by type, model, series, and modification (TMSM).
- Manages engine configuration.
- Manages depot-level repair activities.
- Develops engine factors.
- Maintains an actuarial forecasting system that projects engine removal rates for the programming years based on age related engine removal histories derived from CEMS data and quantitative analysis techniques.
- Manages CEMS, DETS, and ETDS.
- Is the accountable officer for the Air Force Centralized Engine Account, SRAN FJ2031.
- Establishes and publishes relaxed or expedited retrograde transportation factors as conditions permit.
- Develops and sends to MAJCOMs the procedures, methods, and models for computing stock level acquisition and distribution requirements.
- Identifies to MAJCOMs data necessary to accomplish stock-level computation.
- With the MAJCOM EMs, determines air-breathing drone engine unit-stock levels.
- Has overall responsibility for financial management for propulsion systems.
- Computes worldwide stock-level requirement including the depot and safety level stocks.
- Develops engine repair and overhaul requirements.
- Develops retention, reclamation, and disposal computations.
- Disposes out-of-production engines during the phasing out of the aircraft or missile.

2.4. (AFMC) PPGM Responsibilities:

- Serves as chairperson of the CEMS Functional Review Board (FRB). The board reviews func-tionality changes to CEMS.
- Use the Defense Automated Message Exchange System (DAMES) for both CONUS and overseas contractors to eliminate having to input contractor data. Contact DAASC-CI, Gentile AF Station, OH, DSN 986-5914 for procedures to provide contractor software and connection with CEMS. The government provides DAMES software free to contractors. Enters contractor reporting data in CEMS if the contract does not require direct entry through DAMES or on-line reporting.
- Track status in the CEMS Engine Configuration Management System (ECMS) all Time Compliance Technical Orders (TCTO) affecting CEMS tracked items according to TO 00-25-254-1. Issue a supplemental or replacement TCTO to correct the reporting deficiencies for any TCTO issued without CEMS reporting instructions.
- Serves as focal point for all negotiations and distribution of reports between Air Force and other Department of Defense (DoD) services and agen-cies.
- Maintains the official Air Force accountable SRAN FJ2031 for propulsion units managed in CEMS. An individual shall be designated by the PPGM as the accountable officer.
- Provides annual financial, and excess & salvage engine data to DFAS-DE to allow reconciliation of DFAS ledger accounts GLA 143, Uninstalled Propulsion Units, and GLA 147, Excess and Sur-plus Property. Data includes engine type-model-series, aircraft series, quantity, latest acquisition cost, total cost, disposal location, and date of removal from CEMS.
- Management of engines, during acquisition, will be either by the PPGM or the system program director (SPD) as determined during the program conceptual phase.

2.4.1. (Added-AFMC) Propulsion Development System Manager (DSM) Responsibilities:

2.4.1.1. (Added-AFMC) Includes CEMS reporting requirements for all contracts or interservice agreements for new acquisitions.

2.4.1.2. (Added-AFMC) Baselines assumptions for the estimate and a summary of the engine's removal rate broken down in a component, major assembly or module. The estimate will state whether it is for maturity or period(s) of interest (such as reliability growth or wear-out). The assessment will factor in appropriate operational experience for the same or similar design and have an adjustment for a derivative or new design. This adjustment will account for changes in reliability. A total unscheduled removal rate will be provided for each component/assembly/module that includes those events chargeable to the engine, as well as those that are not chargeable to the engine, such as "foreign object damage." In addition, a total scheduled removal rate will be provided for those components/assemblies/modules with time or cycle change limits that include any known, upcoming TCTOs. The assumptions and the assessment will be documented. The engine contractor's removal rate estimates will be obtained, reviewed and differences docu-mented and explained for these in the spare engine computation.

2.4.1.3. (Added-AFMC) Evaluates, at least annually, the number of spare engines during the engine's production run. An assessment will be made of total unscheduled and scheduled removal rates for the period of interest or maturity. The assumptions and the assessment will be documented. Operational experience will be factored in, if field data is available and is judged to affect removal rate for the period of interest or maturity. Design improvements and

any retrofit plans or activity will be factored in, if it is judged to affect the removal rate. TCTOs and changes to time or cycle change limits will be factored into the scheduled removal rate. The engine contractor's removal rate estimates will be obtained, reviewed and differences documented and explained for those used for the spare engine computation.

2.4.2. (Added-AFMC) Propulsion System Support Manager (SSM) Responsibilities:

2.4.2.1. (Added-AFMC) Validates the need to continue to collect CEMS data for each assigned type, model and series (TMS) engine biennially.

2.4.2.2. (Added-AFMC) Monitors Not Mission Capable Supply (NMCS) rates and AFMC engine support. Develops a get well plan to bring engine support rates within the standard when either engine NMCS or support guidelines are exceeded. When this occurs, it requires a get well plan:

- If there are 10 or more TMS engines in a NMCS status and the average engine not mission capable supply (ENMCS) rate is greater than 10 percent of the TMS fleet.
- If the base support posture is less than 90 percent.

2.4.2.3. (Added-AFMC) Includes CEMS reporting requirements for all contracts or interservice agreements for maintenance.

2.4.2.4. (Added-AFMC) Incorporates CEMS tracked items time change limits into the appropriate illustrated parts breakdown tech-nical order at the next major revision, if not already completed.

- Designates and authorizes an individual and alternate to OC-ALC/TILC to maintain and update CEMS part number, limit, and family grouping tables for assigned TMS engines. Change the part number and limit tables only after issuing an interim operational supplement or publishing a formal change to the appropriate technical order.

2.4.2.5. (Added-AFMC) Develops the Application Percent by type, model, series and modification (TMSM) installed in an Aircraft MDS and is file maintained in K008EN (See Attachment 1, Application Percent Development).

2.4.2.6. (Added-AFMC) The SSM's actuarial functions are:

- Establish and maintain computer programs and forecast models to process CEMS data for the purpose of actuarial forecasting and analysis of engine removal rates.
- Develop and distribute quarterly actuarial data products. These products include the Summary of Engine Removals, Management Summary of Actuarial Data, and the Parameter Ratio Report.
- Develop recommended factor changes at least annually based on analysis of CEMS data and inputs from the product group managers (PGM's) staff and major command (MAJCOM) EM. Prepare and distribute Aerospace Engine Life Data formats to display recommended changes and impact charts to show the projected change in future engine removals. Obtain coordination from MAJCOM EMs on factor changes.
- Develop and distribute at least semiannually, Actuarial Removal Interval (ARI) Tables. Establish the data tables by forecast models using the latest factors, engine inventory, and programmed flying hours. Make sure the ARI data meets input needs of the spare engine requirements computation process for acquisition, distribution and

repair. Establish procedures to periodically evaluate accuracy of past ARI forecasts with actual engine removal experience. Take corrective action to im-prove the forecasting process when inconsistencies are found.

2.4.3. (Added-AFMC) Propulsion DSM/SSM Shared Responsibilities:

- Reviews engine warranty compliance.
- Prepares and coordinates CEMS Communications-Computer System Requirements Documents (CSRD) according to AFI 33-103 for assigned engines. To track an additional TMS engine, additional parts or to delete currently tracked parts requires a CSRD to document the requirement in CEMS. Coordinate and sign CSRD. Forward to OC-ALC/TILC for technical programming and determining necessary resources evaluation.

2.4.4. (Added-AFMC) Propulsion Managers Responsibilities are as follows:

- Determines if Air Force can obtain engines to prevent overhaul, modification, conversion, or for spare parts reclamation with PPGM concurrence.
- Condemns engines that can not be economically made serviceable with the SSM approval.
- Monitor the actuarial analysis data for assigned engines. Determine by TMS which factors require adjustment and make the appropriate changes.
- Supports base activations by revising spare en-gine delivery schedules.

2.4.4.1. (Added-AFMC) Propulsion Managers Responsibilities for Depot Level Repair Programming. Schedules the depot repair and contractual repair. Prepares and distributes as follows:

- Prepares a project directive for all TMS engines for the depot. See AFMCR 66-67.
- Verifies supply support is available for the project.
- Submits contractual depot level repair requirements purchase requests with exhibits containing monthly production schedules to procurement.
- Notifies the appropriate MAJCOM EM if an engine is received at the depot for repair or overhaul and is:
- Invalid maintenance according to TMS maintenance plan.
- An invalid condition stated for the engine return i.e., Work Unit Code (WUC).
- Missing required parts without authorization.

2.4.4.2. (Added-AFMC) Engine Item Manager (EIM) Responsibilities are as follows:

- Determines if Air Force retention and potential excess assets are available for transfer to other DoD services, Foreign Military Sales (FMS) and other government agencies with PPGM concurrence. Provides disposition instructions for excess engines. Also refer to the HQ AFMC Disposal Handbook.
- Coordinates each engine shipment with the ALC or contract SRAN EM. Advise them of the unserviceable engine's serial number being replaced or the serviceable engine's serial number being shipped.
- Monitor pipeline standards in TO 2-1-18 through use of CEMS system output products. Initiate corrective action when pipelines exceed the standards.

- Validates and negotiates engine stock levels with the MAJCOMs.
- Provides the engine ALC SRAN EM disposition instructions within one workday of receipt of the engine at the engine ALC.
- Provides the ALC SRAN EM shipping instructions for each serviceable engine by TMS and serial number.
- Coordinates the transfer of engines out of the Air Force inventory with PPGM. This includes transfer to other government or service agencies and to FMS or security assistance programs.
- Coordinates on engine transfer between MAJCOMs.

2.4.5. (Added-AFMC) CEMS Program Manager. OC-ALC/ TILC as the CEMS Program Manager responsibilities are:

- Day to day operations of CEMS.
- Approves CEMS CSRDs that do not add new functionality to the system.
- Accomplishes reconciliation between the CEMS database and interfacing data systems on schedule.
- Maintains an audit trail of documents to support gain or loss of engines from the Air Force account FJ2031.
- Reports data base discrepancies to the SRANs EMs and the command EM for correction.
- Prepares and maintains TO 00-25-254-1, CEMS reporting procedures.
- Maintains the CEMS Users Manual, TO 00-25-254-2.
- Recommends changes to engine directives as necessary to provide correct data reporting to CEMS.
- Interfaces with other data systems, such as core automated maintenance system (CAMS), wea-pon system management information system (WSMIS) and depot maintenance management information system (DMMIS), Tactical Interim CAMS and REMIS Reporting System (TIC-ARRS).
- Serves as OPR for CAMS/CEMS interface program.
- Serves as the CEMS representative to the CAMS Functional Review Board.
- Approves requests for SRANs, maintains and publishes the EJ and FJ portion of DoD 4000.25-D.
- Manages CEMS data base, off-line files, data base security and approves requests for access to the data system using passwords according to DoD and AFIs.
- Makes sure when aircraft are lost from the Air Force inventory with installed engines that the engines are removed from CEMS to prevent engine obligation and requirements computation errors.
- Notifies the affected MAJCOM EM, with an info copy to SA-ALC/LR, whenever there is a failure to receive quarterly flying hour reports.
- Reviews the current status of CEMS unserviceable accountable engines at the ALC SRANs semi-annually where the status has remained the same for more then a year. Coor-

dinates with the appropriate engine SSM or DSM and ALC SRAN EM to determine correct status and initiate corrective action, if necessary.

- Deletes engines from the active inventory in CEMS according to TO 00-25-254-1 if the engine is condemned.
- Serves as the accountable officer for the Air Force Centralized Engine Account, SRAN FJ-2031.

2.4.5.1. (Added-AFMC) OC-ALC/TILC CEMS Configuration Control Board (CCB) Responsibilities:

- Serves as Chairperson of the CEMS CCB.
- Prioritizes CEMS programming workload in accordance with higher headquarters and CEMS FRB guidelines.
- Provides the secretary to the CEMS FRB.
- Notifies chairperson, members, advisors and interested activities of the location and dates of the scheduled meeting.
- Compiles agenda and distributes to attendees.
- Documents the meeting, publishes and distributes the official minutes.

2.5. System Program Directors:

- Are responsible for POM inputs for initial spares, initial common support equipment, and interim contractor support.

2.6. Planning Groups:

- **EAG.** Established according to DoD Instruction 5000.2, *Defense Acquisition Management Policies and Procedures*, February 23, 1991, With Change 1 and Air Force Supplement 1. Reviews and makes recommendations on funding requirements for the *Component Improvement Program*. Membership includes Propulsion PGM (chairperson), Propulsion Management Directors at logistics, product and test centers, operating MAJCOM representatives, HQ AFMC, and SAF Program Element Monitor.
- **PMC.** The PMC reviews overall trends in Air Force propulsion management, establishes propulsion concepts and principles, and addresses propulsion issues of common interest to Air Force EMs. Membership includes the Propulsion PGM as chairperson, all MAJCOM command EMs including AFRES and ANG, and representatives from the ALC/LP offices.
- **MPG.** The Propulsion PGM establishes a MPG for each type, model, and series (TMS) engine to review and validate the maintenance plan developed according to DoD Instruction 5000.2 with Air Force Supplement 1, and AFI 21-102, *Depot Maintenance Management* (formerly AFRs 66-1, 66-3, 66-7, and 66-11. Membership includes the chairperson (Propulsion PGM), representatives from the subject engine ALC, appropriate product center, the depot engine repair facility, the operating MAJCOMs, and the engine manufacturer.
- **ERO.** The Propulsion PGM establishes an ERO for each TMS engine to review and validate whole engine factors. The Propulsion PGM's office chairs the ERO. Membership includes personnel from AFMC Centers, operating MAJCOMs, including AFRES and ANG, and the engine manufacturers.

- **Propulsion Environmental Working Group (PEWG).** The PEWG facilitates the technical interchange of environmental information between the developers, manufactures, users, and logistics supporters of propulsion programs. Its membership consists of representatives from government and contractor organizations. Under the environmental Product Area Committee Charter, the PEWG will have a formal Integrated Product Team to implement the pollution prevention requirements of SAF/AQ Policy 93M-011.

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Attachment 1

GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS, AND TERMS

References

DoDD 4000.19, *Interservice, Interdepartmental, and Interagency Support*

DoDI 5000.2 , *Defense Acquisition Management Policies and Procedures*

AF SUP 1

AFPD 21-1, M*anaging Aerospace Equipment Maintenance*

AFI 21-102, *Depot Maintenance Management*

AFMAN 23-110, *USAF Supply Manual*

AFJI 23-215, *Report of Item and Packaging Discrepancies*

AFI 23-501, *Retention and Transfer Policy*

AFI 24-204, *Preparing Hazardous Materials for Military Air Shipments*

AFI 25-201, *Support Agreements Requirements,*

(Added-AFMC) AFI 33-103, *Information Systems Requirements Processing*

(Added-AFMC) AFI 37O-133V2, *Disposition of Air Force Records*

AFI 64-104, *Weapon System Warranties*

(Added-AFMC) AFI 65-501,*Cost Benefit Anaysis*

(Added-AFMC) AFMCR 66-67, *Materiel Management Customer Related Resource**s***

(Added-AFMC) AFMCI 21-103, *Reliability Centered Maintenance Program*

(Added-AFMC) AISRF, *Aircraft Initial Spares Requirement Format*

(Added-AFMC) DFARS 46.770-8, *Waiver and Notification*

(Added-AFMC) DoDI 4160.21, *DoD Personal Property Utilization and Disposal Program*

DoDI 5000.2, *Air Force Supplement to DoD Instruction 5000.2 Acquisition Management Policies and Procedures*

(Added-AFMC) TO 00-20-1, *Preventative Maintenance Programs*

TO 00-20-5-1-X, *Instructions for Jet Engine Parts Tracking*

(Added-AFMC) TO 00-25-115, *Logistics Maintenance Engineer Management Assignments*

TO 00-25-254-1, *CEMS Engine Status, Configuration and TCTO Reporting Procedures*

TO 00-25-254-2, *Comprehensive Engine Management System Manual for DSD: D042*

(Added-AFMC) TO 00-20-254-3, *Engine Trending and Diagnostics System (ETDS)*

TO 00-25-257, *Engine Trending and Diagnostics System (ETDS)*

TO 00-85-20, *Engine Shipping Instructions*

TO 2-1-18 *Aircraft Engine Operating Limits and Factors*

TO 2J-1-18 *Preparation For Shipment and Storage of Gas Turbine Engines*

Abbreviations and Acronyms

(Added-AFMC) ABES—Amended Budget Estimate Submission

(Added-AFMC) AFI—Air Force Instruction

AFMC—Air Force Materiel Command

AFPD—Air Force Policy Directive

AFRES—Air Force Reserves

ALC—Air Logistics Center

(Added-AFMC) AMC—Air Mobility Command

ANG—Air National Guard

(Added-AFMC) APU—Auxiliary Power Unit

(Added-AFMC) ARI—Acturial Removal Interval

ASC—Aeronautical Systems Center

BES—Budget Estimate Submission

(Added-AFMC) BPPBS—Biannual Planning, Programming and Budgeting System

(Added-AFMC) CAMS—Core Automated Maintenance System

(Added-AFMC) CBA—Cost Benefit Analysis

(Added-AFMC) CCB—Configuration Control Board

CEMS—Comprehensive Engine Management System

CII—Configured Item Identifier

CIP—Component Improvement Program

(Added-AFMC) CSRD—Communications-Computer Systems Requirements Document

(Added-AFMC) DAMES—Defense Automated Message Exchange System

DETS—Deployable Engine Tracking System

(Added-AFMC) DMMIS—Depot Maintenance Management Information System

DoD—Department of Defense

(Added-AFMC) DPEM—Depot Purchased Equipment Maintenance

DRMO—Defense Reutilization and Marketing Office

DSD—Data System Designator

DSM—Development System Manager

EAG—Engine Advisory Group

(Added-AFMC) ECMS—Engine Configuration Management System

(Added-AFMC) EIM—Engine Item Manager

EM—Engine Manager

EMDP—Engine Model Derivative Program

(Added-AFMC) ENMCS—Engine Not Mission Capable Supply

ERO—Engine Review Organization

ETDS—Engine Trending and Diagnostics System

FMS—Foreign Military Sales

FOL—Forward Operating Location

(Added-AFMC) FRB—Functional Review Board

FSC—Federal Stock Class

FSP—Forward Supply Point

(Added-AFMC) GWAM—Get-Well Assessment Module

(Added-AFMC) IAW—In Accordance With

ILS—Integrated Logistics Support

JEIM—Jet Engine Intermediate Maintenance

JPCC—Joint Propulsion Coordinating Committee

(Added-AFMC) LRRS—Line Recoverable Requirements System

MAJCOM—Major Command

(Added-AFMC) MDR—Materiel Deficiency Report

MGM—Materiel Group Manager

(Added-AFMC) MOA—Memorandum of Agreement

(Added-AFMC) MOD—Modification

(Added-AFMC) MOIA—Mission Oriented Items Activity

MPG—Maintenance Planning Group

MPWG—Maintenance Planning Working Group

(Added-AFMC) MRL—Materiel Requirement List

(Added-AFMC) NMCS—Not Mission Capable Supply

NSN—National Stock Number

(Added-AFMC) PB—President’s Budget

(Added-AFMC) PDM—Program Directed Maintenance

PEM—Program Element Monitor

PEWG—Propulsion Environmental Working Group

PGM—Product Group Manager

PMC—Propulsion Management Committee

POM—Program Objective Memorandum

(Added-AFMC) PPGM—Propulsion Product Group Manager

PRS—Propulsion Requirements System

QEC—Quick Engine Change

(Added-AFMC) RCM—Reliability Centered Maintenance

(Added-AFMC) RCS—Reports Control Symbol

RDD—Required Delivery Date

REALM—Requirements/Execution Availability Logistics Module

RIPS—Remove, Inspect, Process to Ship

SA—Security Assistance

SAM—Sustainability Assessment Module

SPD—System Program Director

SRAN—Stock Record Account Number

SSC—Standard Systems Center

(Added-AFMC) SOF—Special Operations Forces

SSM—System Support Manager

TCTO—Time Compliance Technical Order

(Added-AFMC) TICARRS—Tactical Interim CAMS and REMIS Reporting System

(Added-AFMC) TM—Type, Model

TMS—Type, Model and Series

TMSM—Type, Model, Series and Modification

TO—USAF Technical Order

USAF—United States Air Force

(Added-AFMC) WAA—Wartime Active Aircraft

WMP—War and Mobilization Plan

WRE—War Reserve/Readiness Engines

WSMIS—Weapon System Management Information System

(Added-AFMC) WUC—Work Unit Code

Terms

Accountable Officer-—The designated individual required to ensure accurate property records are maintained.

Command Engine Manager—The focal point for engine management matters for the command.

Comprehensive Engine Management System (CEMS)—CEMS provides WSMIS/SAM (D087C) with inventory data (both on hand and authorized), Family Group Codes, and Engine MS, to accomplish integrated Unit Level assessments for the Status of Resources and Training Systems (SORTS)

Development System Manager (DSM)—The Lead individual at an AFMC product center when a single manager (SPD, PGM or MGM) located at another center delegates a specific development task to a product center. The DSM reports directly to the single manager.

Current Factors—The current engine actuarial and pipeline factors developed from actual operational experience. (TO 2118)

Engine Model Derivative Program—The EMDP is an engineering development program that provides the latest in engine technology. EMDP supports the needs of the Propulsion Product Group Manager, System Program Directors and using commands. Customer needs are identified through direct interface and through involvement in the Technology Planning Integrated Product Teams (TPIPT predict the total number of engines required to support the weapon system through out its life cycle.

JEIM Return Rates—The percentage of engines that will be repaired and returned to service by the JEIM (TO 2118).

LifeofType Buy (Buyout)—Acquisition of enough total spares required to support the entire planned weapons system's life cycle prior to ceasing engine production.

Mission, Design, and Series (MDS)—Standard nomenclature for both aircraft and missiles.

Operating Unit—A term used in determining requirements. Defined as the lowest level tasked in planning documents for independent deployment or operational capability.

Peacetime Assets—Assets for day to day peacetime operations.

Engine Trending & Diagnostics—An analysis which provides engine health data to base level personnel and depots to aid in engine maintenance planning. ET&D evaluates engine health onwing and identifies adverse trends in mechanical operation, performance, and material wear so proper corrective maintenance can be performed..

Factor—A value used in computing requirements and doing assessments. Factors are developed for peace (readiness), and for war (surge and sustained).

Forecasted Factors—Factors developed which predict what the official factors will be when the engine has reached stability. Engine stability on most development programs is achieved by 0.75 to 1.0 million engine hours of fleet operation or 5 to 7 years of operation. Forecast factors are used to

Product Group Manager (PGM)—The individual managing an AFMC Product Group who is ultimately responsible and accountable for decisions and resources in overall product group management. The PGM is the person who is charged with all cost, schedule, and performance aspects of a product group and related sustainment activities. Typically, the PGM's product is in direct support of one or more aircraft or nonaircraft systems SPD's.

Propulsion Requirements System (PRS)—(WSMIS/REALM/PRS (D078Q)) is the Air Force standard system for the computation of: (a) whole engine stock levels for both acquisition and distribution (b) overhaul requirements and (c) retention requirements. PRS must provide WSMIS/SAM (D087C) with the computational data needed to assess whole engines and modules for SORTS.

Quick Engine Change (QEC) Kit—Externally mounted components needed to adapt and install the engine to the weapon system.

Reparable Engines—An engine requiring maintenance action before being a serviceable asset.

Requirements Computation Periods:—

1. *Peace*--Computes spare assets needed for readiness capability.
2. *War:*
3. *Surge*--Computes spare assets needed to sustain the war effort until pipelines are filled and repair facilities are available.
4. *Sustained*--Spare assets needed to sustain the war effort for a long duration.

Retrograde—Time it takes an item to be returned from the unit to source of repair.

Scheduled Engine Removal—A planned engine removal due to required maintenance actions.

Unscheduled Maintenance—Periodic prescribed inspection and/or servicing of equipment accomplished on a calendar, cycles, or hours of operation basis.

Serviceable Engine—An engine ready to be builtup or installed.

SRAN Engine Manager—Manages all engines possessed by the SRAN and is responsible for CEMS reporting.

Sustainability Assessment Module (SAM)—SAM predicts the combat capability of tactical, strategic, and airlift weapon systems for a given set of operations plans, logistics assets, and logistics performance factors. SAM provides insights into how well the onhandlogistics resources (spares, engines, and consumables) support the wartime tasking. SAM also identifies potential logistics limitations (i.e., resources and processes) which need to be improved to increase the probability that required performance levels will be met.

System Support Manager (SSM)—The lead individual at an AFMC logistics center responsible for support when the single manager (SPD, PGM or MGM) is located at another center. The SSM reports directly to the single manager.

Type, Model, Series Modification (TMSM)—Standard nomenclature for engines according to MILSTD879.

Unscheduled Engine Removal—An unplanned engine removal due to failure or malfunction.

Unscheduled Maintenance—Unplanned maintenance actions required.

War Reserve/Readiness Engines (WRE)—The quantity of serviceable engines required to support an operational units increased activity and/or problems caused by delay in maintenance deployment, extension of transportation pipelines, or operational peculiarities during war.

Attachment 2

ENGINE MANAGEMENT

A2.1. Selected Engines. Selected engines provide propulsion power to manned and unmanned aircraft. TO 00-25-254-1 lists the specific engine TMSM that are managed according to this AFI. This AFI excludes the following engines:

- Reciprocating engines, engines that provide auxiliary aircraft power, and ground-based engines.
- Engines that are certificated by the Federal Aviation Agency and maintained by contractor logistics support (e.g., installed on cargo and passenger aircraft that are essentially commercial models).
- Engines installed on classified aircraft. These latter two categories of engines have their own equivalent management systems.

A2.2. Engine Asset Management. SRAN engine managers input CEMS data by serial numbers according to TO 00-25-254-1 for all accountable and non-accountable tracked items. SRAN and MAJCOM EMs use these data to evaluate the health of engines in individual accounts and to predict removals, repair, and spare engines. The Propulsion PGM, engineers, actuaries, and item managers use these data to help manage the engines; predict requirements for acquisition, distribution, repair, and retention; maintain repair facilities; and manage spare parts to repair engines and components.

A2.2. (Added). Reference attachment 4 for Application Percent development and File Maintenance for D041 and K008.

A2.3. Whole Engine Accountability. This AFI identifies accountability requirements for whole engines and selected critical engine parts. The Air Force uses the standard supply system to account for critical engine parts.

A2.3.1. The Air Force uses measurement techniques, modeling, and comparability analysis methods to develop whole engine flow times from the evaluation of major assembly repair requirements and probabilities. Otherwise, pipeline times use statistical analysis and adjustment techniques on CEMS pipeline data.

A2.4. Whole Engine Requirements:

A2.4. (AFMC) Reliability Centered Maintenance (RCM). The PPGM implements and sustains a RCM program for each TMS engine according to AFMCI 21-103 and TO 00-20-1 Section VII as part of the maintenance plan.

A2.4.1. Tools. The Air Force uses measurement techniques, modeling, and comparability analysis methods to develop whole engine flow times from the evaluation of major assembly repair requirements and probabilities. Otherwise, pipeline times use statistical analysis and adjustment techniques on CEMS pipeline data.

A2.4.1. (AFMC) Engine in Acquisition. The Propulsion DSM includes a RCM program in the engine maintenance plan and identifies specific contractual terms in the acquisition contract. The engine DSM/SSM limits RCM data system requirements for a new acquisition so it conforms as close as possible with currentdata system capabilities.

A2.4.2. Factors Development. Engine managers use forecasted factors to compute spare engine life-of-type acquisition requirements including the buyout. They use current factors instead of forecasted factors for spare engine acquisition support early in the program if there is inadequate support or there is excessive support and deferring the procurement is possible. Forecasted and current factors for calculating spare engine requirements include whole engine removal rates, Jet Engine Intermediate Maintenance (JEIM) return rates, quick turn percentages and pipeline times. Factors development:

- Uses the assumptions that engines have a zero wear out rate and that all unserviceable spare engines are reparable.
- Considers the current factors for engine acquisition programs when there is significant military or commercial performance and reliability experience.
- Reflects the TMSM or combined TMSM at either worldwide or command level due to mission, operation, support differences or requirements calculation methods.

A2.4.2. (AFMC) Operational Engines. The Propulsion SSM uses a partial RCM program based on experience, if a full RCM implmentation is no practical due to system complexity, current and future inventory quantities, phase out schedule, or the cost of establishing and sustaining it. Process any RCM program waiver requests IAW AFMCI 21-103.

A2.4.3. Forecast Factors. Forecasted factors, formerly called mature factors, determine spare engine acquisition requirements and are the basis for the engine life-of-type buy concept. They are estimated factors that will be achieved when the engine has stabilized through operational experience. Stability is normally reached:

- Either between 0.75 to 1 million fleet engine flying hours.
- Five to seven years after initial operational capability.
- Earlier for commercial or military engine model derivative programs.

Forecasted factors represent the average requirement between the period from initial program stability to the end of economic life.

A2.4.3.1. Forecast factors incorporate all sources of information, including planned improvements. They include the latest data of comparable TMS engines, manufacturer's data analysis and recommendations, and actual operational experience when available. They do not include data from early engine program performance or support irregularities to forecast factors for the life-of-type buyout.

A2.5. Whole Engine Removal Rates. Engine removal rates are the number of engines removed per thousand flying hours. Engine managers use engine removal and JEIM return rates to determine spare engine requirements.

A2.5.1. Internal procedures to document estimated engine removal rates are:

- Baseline assumptions and estimating relationships, which include individual component estimates, in an engineering summary.
- Rationale for changes between contractor submittals.
- Rates appropriate to determine spare engine requirements, excluding engine removals projected solely to replace line replaceable units.

A2.5.2. Removal rates are based on all unscheduled, scheduled, and non-usage removals at any maintenance level and incorporate the effects of maintenance policies that govern the removal of life-limited components.

A2.5.3. Removal rates for peace, surge, and sustainment use mission profiles and weapon system utilization rates contained in the latest Air Force programming documents. They may include:

- Sortie duration and mission severity.
- Runway usage, improved or unimproved.
- Load weights.
- Operational environment.
- Frequency and types of landings and takeoffs.

A2.5.4. JEIM return rates are estimates of the number of engines repaired and returned to service at the unit level. Computing return rates requires a coordinated maintenance concept and consideration of the other Integrated Logistics Support (ILS) elements.

A2.5.5. The estimated average engine flow time through each segment of the pipeline is based on the following: occurrence frequency, manpower, facilities, tools, equipment, parts, technical data, and maintenance and supply delays.

A2.6. Computations. The microcomputer based Propulsion RequirementSystem (PRS) allows any organization in the Air Force to compute whole engine requirements. MAJCOMs compute their own requirements and the Propulsion PGM computes worldwide requirements that include all users and depot requirements.

A2.6.1. Stock-Level Computations. Acquisition and distribution requirements computations are based on:

- Flying hours and removal rates.
- Return rates.
- Pipeline factors.
- Maintenance scheduled events.
- Deployment capability.

The computations must consider the transition between peace and war (surge and sustained) and whether peace assets are available to repair or reuse. If peace assets are available at a base in the combat theater, the stock level is the higher of peace or war requirement. The War Readiness Engines (WRE) requirement is the quantity needed above the peace level. If peace assets are not available to a unit that deploys to a bare base and repair capability is not immediately available, the unit requires that number of assets necessary to provide a remove and replace maintenance action, i.e., peace plus war requirements. The WRE requirement is the difference between the peace level and the war level. Stock level requirements are maintained at the lowest level based on the current war planning document.

A2.6.2. Acquisition Computations for Operating Units and Depot. The total acquisition requirement for spare engines is the sum of peace and war requirements across all operating units plus the depot repair cycle requirement. Determine this requirement by using:

A2.6.2. (AFMC). Reference attachment 6 for instructions on engine acquisition budget documentation.

- Forecasted factors.
- Peacetime and war flying hours.
- Review of mission tasking.
- Peace and war beddown locations.
- The propulsion system and aircraft maintenance concept.
- Repair and transportation pipeline times.
- Maintenance availability and schedule.
- Depot resupply.
- Aircraft procurement and delivery schedules.

A2.6.3. Distribution Computations for Operating Units and Depot. The spare engine distribution requirements are the greater sum of peace or war requirements across all operating units plus the depot repair cycle requirement. Determine this requirement using:

- Current factors.
- Peace and war flying hours.
- Review of mission tasking.
- Peace and war beddown locations.
- The propulsion system and aircraft maintenance concept.
- Repair and transportation pipeline times.
- Maintenance availability.
- Scheduled depot resupply.

A2.6.4. Distribution of Assets. Distribution of actual on-hand assets must first satisfy peace levels across all MAJCOMs. Any remaining assets are distributed equitably between MAJCOMs. The MAJCOMs distribute all assets. When there is not enough assets for demands, the commands EMs shall negotiate redistribution.

A2.6.5. Segments To Be Computed. Engine managers compute each unit's operating stock to support the minimum unit and depot stock acquisition and distribution pipelines. Compute unit operating stock to fill:

- Order and ship time with build up time for depot resupply pipeline.
- Base repair cycle pipeline.
- Remove, Inspect and Process to Ship (RIPS) pipeline.
- Safety level.
- WRE.
- Special mission additives.
- Preposition and prestock.
- Multiple Quick Engine Change (QEC) configurations that are required to be built up to at least 80 percent to make ready for installation.

- Supply and maintenance pipeline for centralized JEIM repair facilities and supported unit. Compute depot repair cycle stock using:
- Repair cycle, including safety levels.
- Retrograde pipeline.

A2.6.6. Standard Computation. Regardless of the method or model, the following identifies the minimum computations required for both acquisition and distribution:

- **Peace and War (Surge and Sustain).** Separate computations for each TMSM engine which include the peak requirement for both peace and war programs including mobilization programs.
- **Support Period.** Includes the fiscal year immediately following the procurement lead time of the engine based on the aircraft delivery schedule.
- **Additional Flying Hour Requirements.** Short duration peaks are special mission support, alert, rotation hours or special surge requirements for wartime sorties called for by Defense Guidance or found in the standard planning and programming documents. Short duration peaks in flying hour programs are treated separately and validated with the command EM.
- **Safety Stock Levels.** Safety stock protect against pipeline shortages due to the uncertainty in the forecasted demand, repair production processes and transportation pipeline performance. Compute safety stock levels for:
- The depot based on repair and retrograde pipelines. If a TMSM engine is supported by more than one depot repair facility, do it for each depot.
- Each unit with an independent deployment or operational capability for both base repair and depot resupply pipelines.
- Centralized JEIM repair facilities based on base repair, retrograde from the supported unit and depot resupply pipelines.
- Each Forward Operating Location (FOL) and Forward Supply Point (FSP) based on the serviceable resupply pipeline from the JEIM site.

A2.6.7. War Delays and Transportation Pipeline Assumptions. See WMP, volume 1, annex E, *Supply Class 7X*.

A2.6.8. Unit-Level Requirements Modeling. The Propulsion Requirements System (PRS) computes safety stock levels at the lowest supply level. For those units that fly and fight in place, consider peacetime assets as available to be repaired as long as JEIM is available and the unit has a remove and replace capability. Stock this type of unit with the greater of their peace or war requirement. For those units that deploy, determine the disposition of the peacetime assets. If the assets are available on the first day of the war for the repair pipeline, stock the unit with the greater of their peace or war requirement. If the peacetime stocks are not available for the repair pipeline and subsequent production at some later date, stock the unit with peace plus war requirements. Compute preposition requirements for aircraft that fly in and out of numerous locations in theater and have only limited remove and replace capability if a failure occurs. The total number of spare engines required at a specific base, with more than one unit with the same Mission Designs Series (MDS) and TMSM combination is the sum of each unit's peace or war requirement.

A2.6.9. Condemnation. Assume that engines have a zero wear-out and condemnation rate and are repairable. This does not prevent condemning an engine when the repair cost equals or exceeds the current acquisition cost.

A2.6.10. Cannibalization. Do not consider cannibalization when determining engine requirements. Due to the frequency of changes in operational programs and support capabilities, it is not practical to assess the impact of potential cannibalization.

A2.6.11. Special Stock Levels Engine managers generate special stock levels for:

- Engines with small inventories.
- Air breathing drone engines.

Use the following percentages to establish stock levels when 10 or less new MDS aircraft are to be procured or remain in the inventory:

- Single engine aircraft, 50 percent.
- Twin engine aircraft, 40 percent.
- Aircraft with more than two engines, 30 percent.

The owning MAJCOM and Propulsion PGM jointly determine the operating unit's stock level for air-breathing drone engines. These stock levels are based on the operational and maintenance concept and the number of drones authorized for each location.

A2.6.12. Engine Procurement Policy. Limit spare engine acquisition to the smallest number of engines essential to support the largest programmed requirement for each increment of the weapons system's production contract. During Demonstration and Validation phase, perform an analysis to determine the cost effectiveness of making a buyout decision for the TMSM engine. If the TMSM engine is a commercial or commercial derivative engine, conduct a life cycle cost analysis considering the benefits of a fixed inventory and the associated costs for support and modifications. Before engine production ends, procure the quantity necessary to support the weapon system's life cycle.

A2.6.13. Inventory Adjustments to Acquisition Requirements. A source of supply to offset acquisition requirements can be:

- Transferable retention engines in Air Force inventory, other DoD components, and other government agencies.
- Research, development, test, and evaluation engines, and excess or potential excess engines that can be economically modified to the new configuration. After modification, convert these engines to spares as soon as possible .
- Excess engines identified anytime during the life cycle may be used as donors for the planned recovery of assemblies and spare parts.

A2.6.14. Frequency. Forecast the next fiscal year's stock level by 15 April of each year. The deadline for acquisition programs for the Budget Estimate Submission (BES), Amended BES, and the POM cycle is 1 Aug of each year. Perform budget calculations for acquisition and distribution in time to support the budget process. Recalculate requirements whenever a significant event occurs.

A2.6.15. Engine Repair and Overhaul Requirements MAJCOMs forecast their engine repair and overhaul requirements prior to periodic negotiations with engine depots. Procedures and models are

established to forecast requirements to support the stock level policy, special projects, security assistance programs support, and consolidate worldwide engine repair and overhaul requirements.

A2.6.16. Retention, Reclamation, and Disposal. AFI 23-501, *Retention and Transfer Policy* (formerly AFR 67-97) identifies requirements for retention of spare engines. DoD Directive 4000.19, *Interservice, Interdepartmental, and Interagency Support*, April 15, 1992, and Joint Regulations govern spare engine reclamation and disposal. Reclamations are excess to Air Force, other services, and FMS system support needs. The only exception is for engines on the save list of donated aircraft and missiles (see AFMAN 23-110, *USAF Supply Manual* (formerly AFM 67-1, volume VI, chapter 9).

A2.6.17. Excess Engines. If there are excess engines in production, terminate or modify the contract to eliminate the excess. If the engines are out of production, dispose of the engines during the phasing out of the aircraft or missile. Reclamation engines and residue are transferred to the local Defense Reutilization and Marketing Office (DRMO) activity for disposal according to AFMAN 23-110 (formerly AFM 67-1, Volume VI).

A2.7. Packaging, Handling, Storage and Transportation. Protect engines from corrosion, shock, and vibration damage during transportation, handling and storage according to TO 2J-1-18 and TO 00-85-20. Report damaged items due to improper packaging according to TO 2J-1-18, AFI 24-204, *Preparing Hazardous Materials for Military Air Shipment* (formerly AFR 71-4) and AFJI 23-215, *Report of Item and Packaging Discrepancies* (formerly AFR 400-54). TO 00-85-20 specifies shipping devices for the TMS engine.

A2.7.1. DD Form 1348-1 Special Preparation Instructions for Engines: The SRAN EMs prepare DD Form 1348-1, **DoD Single Line Item Release/Receipt Document** or DD Form 1348-1A, I **ssue Release/Receipt Document** for all engine shipments and transfers. Retain this form until CEMS records are updated. Prepare a form for each shipment and transfer as follows:

- Enter the Federal Stock Class (FSC) and TMSM in the stock/part number block.
- Enter the engine identifier code (two alpha character code listed in TO 00-25-254-1) in the document number block.
- Enter the Required Delivery Date (RDD) in the requisition delivery date block.
- Enter the engine serial number in the item nomenclature block.
- Enter the National Stock Number (NSN) of the transportation device (trailer, stand, container and mounting adapters--see TO 00-85-20) in the remarks block.
- Complete all other blocks of the form according to AFMAN 23-110.

A2.7.2. (Added-AFMC) Air Force transportation policy for engines is to ship them to arrive at their final destination by the required delivery date (RDD) at the lowest cost. Transportation guideline for selecting the mode for moving engines are as follows:

- Use opportune airlift when possible.
- Authorize Air Mobility Command (AMC) airlift between CONUS and overseas.
- Authorize commercial air when a valid emergency exists.

A2.8. Engine Manufacturers Warranty Program. Consider warranties for each new TMS engine acquisition. Warranties must be simple, enforceable, affordable, and not disrupt existing procedures for logistics support or data systems, nor require extensive new data systems to administer.

A2.8. (Added-AFMC). Propulsion Warranty Objective. Develop warranties jointly with the acquiring and using commands. Consider warranties for the TMS level whole engines. Include specific engine warranty tracking and management criteria according to the appropriae TO 00-20-5-1-(X) for the TMS engine.

A2.8.1. (Added-AFMC) Warranty Implementation Planning. The acquiring activity prepares a warranty implementation plan according to AFI 64-104.

A2.8.2. (Added-AFMC) Write engine performance warranties at the TMS engine level.

A2.8.3. (Added-AFMC) Limit warranty tracking criteria to data collected as a part of normal engine or component usage. Do not add component parts in CEMS for warranty tracking purposes only. Support with a cost benefit analysis (CBA) a decision to track any item for warranty purposes only.

A2.8.4. (Added-AFMC) Economic Analysis. The acquiring activity completes the CBA prior to contract award. The CBA considers factors which influence the cost of support over the life cycle of the warranty. Also, the CBA considers potential payback to the government compared to the total cost of the warranty contract plus government costs impacting administration, data systems, data collection, extended pipelines, and any other actions necessary in direct support of the warranty. DFARS 46.770-8 contains DoD policy concerning a CBA. AFI 65-501 provides Air Force guidance for conducting the CBA as well as when to accomplish and update.

A2.8.5. (Added-AFMC) Data System Change. The acquiring activity completes the CSRD according to AFI 33-103 describing the performance warranty information tracking requirements.

A2.9. Comprehensive Engine Management System (CEMS) (DSD D042). CEMS provides a wide range of automated information system capabilities for engine management. TO 00-25-254-1 provides CEMS reporting requirements and procedures and TO 00-25-254-2 provides procedures on using data in CEMS. CEMS identifies owning SRAN, status, condition, and configuration information for all CEMS accountable engines by serial number and Configuration Item Identifier (CII). CEMS also incorporates the Engine Configuration Management System (ECMS). The ECMS capabilities of CEMS include the following:

- Configuration accounting and control by serial number and CII for CEMS accoun table whole engines and CEMS non-accountable tracked items.
- Management of Time Compliance Technical Orders (TCTO) including serialized applicability and completion status.
- Tracks life limits and life expended for life limited parts also reference TO 00-20-5-1-X series.

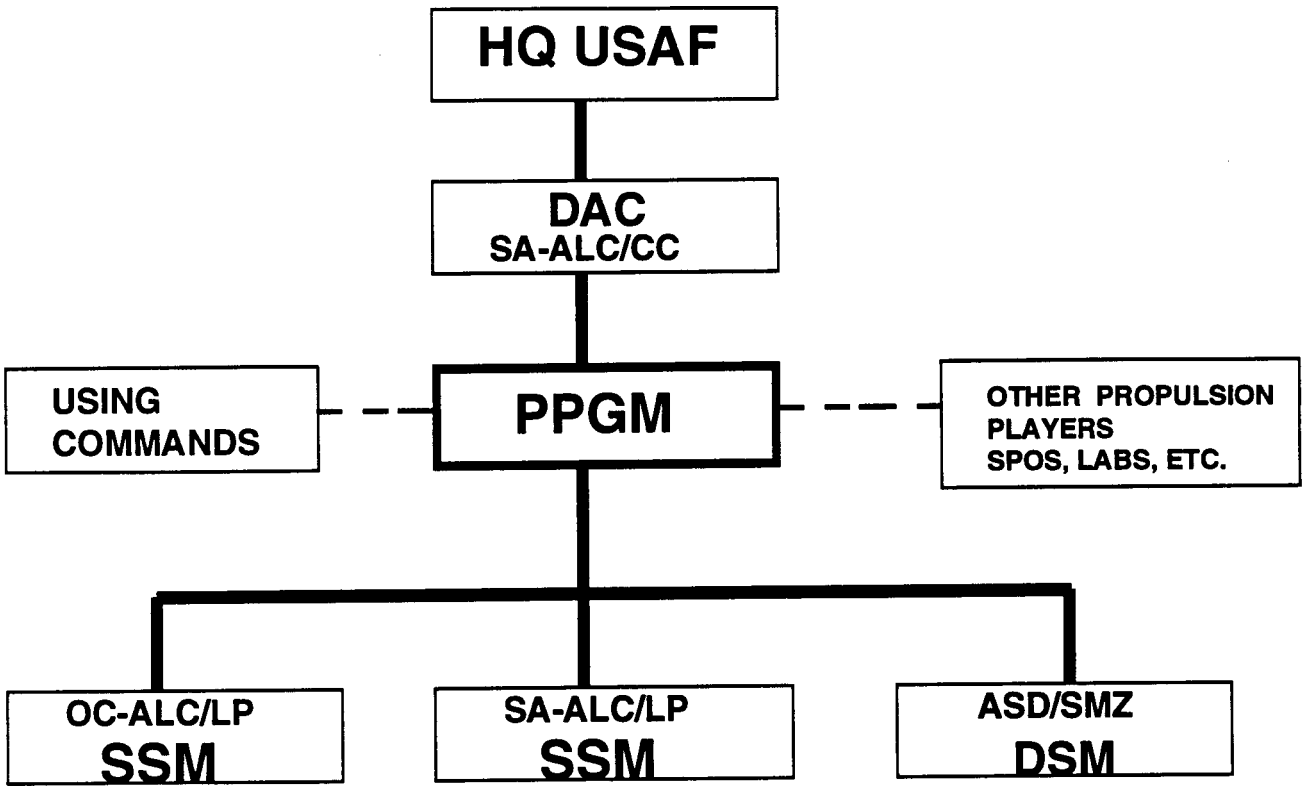
A2.9. (AFMC) Automatic Resupply. The reporting of allocation and distribution of CEMS accountable gas turbine engines, FSC 2840, is done automatically through the DEMS Propulsion Unit Automatic Resupply Report, RCS: HAF-LGM(D)8218. Automatic resupply is based upon authorized stock levels compared to the quantity on hand.

A2.9.1. Engine Trending and Diagnostics (ET&D). CEMS IV is the Air Force standard system which processes, correlates and plots engine performance, oil analysis and maintenance data used to diagnose the health of an engine for engine maintenance shops. Use ET&D for all engines. Health monitoring and diagnostic systems for newly developed TMS engines will be compatible with ET&D according to TO 00-25-257. These personnel use ET&D:

- Base and depot-level engine maintenance shops to monitor trends in engine health, perform diagnostics, and monitor systems according to TO 00-25-257.
- Flight line personnel to collect raw engine data and transfer data to the base engine maintenance shop for analysis.
- Aircrew personnel to annotate appropriate flight data for later transfer to the base engine maintenance shop for analysis.
- Engine oil analysis personnel to send oil analysis program data to appropriate base engine maintenance shop for inclusion in ET&D analysis.
- Base engine maintenance shop ET&D personnel to send ET&D records to the depot with engines, controls, accessories, maintenance items subject to repair and modules returned to depot for overhaul.

A2.9.2. Deployable Engine Tracking System (DETS). DETS is a deployable "mini-core automated maintenance system (CAMS)/CEMS" that runs on Air Force standard microcomputers. DETS is the management tool for tracking engines during deployments.

Figure A2.1. Propulsion Organization.



NOTE:

The Propulsion PGM is responsible and accountable for propulsion program execution and reports to the DAC for all matters affecting the PPG. These responsibilities include the oversight of acquisition program, and propulsion sustainment activities, the development of PPG long range goals and master plan,

advocacy for propulsion program resources, advisor for resolution of propulsion related issues, and interface with other agencies.

A2.10. (Added-AFMC) D041:

- Establish or change MDS/PE Code/Stock Number Quarterly Projected Program.
- Verify or updae the quarterly overhaul requriements. Annotate changes and corrections on a copy of the ALC Application Program (product identifier D041.-GT1). Obtain application designators from the local D041 ORP. Change from input to actual contract or organic output the figures for the all previous quarters prior to the update.
- Make sure the projected overhaul program is input into the USAF Recoverable Item Requirements Computation System and D041 On-Line Recoverable Requirements system (OL-RRS) according to local instructions.
- See Attachment 5 for procedures for computing D041 engine overhaul input requirements.

Attachment 3

REPORT CONTROL SYMBOLS FOR CEMS D042A PROPULSION UNIT STATUS PRODUCTS

Table A3.1. RCSs for CEMS D042A.

L	A	B	C	D	E	F
I						
N						
E	RCS	Title	Freq/Media	As Of/ Due Date	Emerg Status	Description
1	RCS: HAF-LGM(AR) 8215	Comprehensive Engine Management Transactions	AR AUTODIN	AR	C1	Provides output products used in the worldwide management of propulsion units
2	RCS: HAF-LEY(D) 8218	Propulsion Unit Automatic Resupply Report	Daily Tape	Daily	C1	Provides allocation and distribution of engines.

Attachment 4 (Added-AFMC)

APPLICATION PERCENT DEVELOPMENT AND FILE MAINTENANCE FOR DO41 AND K008

A4.1. (Added-AFMC) General. The K008 Aircraft/Engine Factor Table shows the application percentage of the TMSM aircraft engines installed in each mission, design, series (MDS) aircraft. This table along with the USAF PA program identifies future engine inventories and flying hours (FH) by quarter for nine fiscal years (FY). The DO41 Recoverable Item Computation system gets past and projected engine operating hours from the D200P Past and Projected Programs system. D200P Computes engine operating hours using flying hours per Quarter for the aircraft times the number of engines installed on the aircraft (the QPA) times the percent of the fleet that have that engine installed for the quarter (the application percent). D200P has tables for each aircraft/engine combination with the QPA and the application percent for 38 quarters.

A4.2. (Added-AFMC) Reporting Responsibility. The PGM actuarial staff provides new MDS/TMSMs and their application percentages, and changes to the subject data.

A4.3. (Added-AFMC) Frequency. At least once a year, the D041 OPR at HQ AFMC (LGII) forwards copies of the D041 aircraft/engine tables to the D041 OPRs at SA-ALC (FMIR) and OC-ALC (FMIRA). Copies are then forwarded to the various engine managers for validation and update.

A4.4. (Added-AFMC) Validation of D041. The engine manager validates that each type of aircraft (MDS) that each engine is installed on, is listed on the D041 tables, and that the QPA is correct. The application percentages are computed according to paragraph 12. The maximum application percent is 1.00 and the minimum is 0.00. Changes can be marked on the copy or the information can be provided in any legible format. Any corrections, additions and/or deletions are returned to the local FMIR office, who will forward the lists to the HQ AFMC (LGII) DO41 OPR.

A4.5. (Added-AFMC) Instructions for Preparation. The OPR for K008 is AFMC/XPI. The appropriate SSM/DSM Office prepares an AF Form 1530, Data Entry Form, for data entry according to paragraphs 6 through 9 to update of the K008EN system on receipt of new MDS/TMSM combinations, percentages and ratio factors. This input is submitted to AFMC/XPI for appropriate processing. See paragraphs 10 through 12 for K008EN system and products.

A4.6. (Added-AFMC) K008EN Column Entry. Enter the data on AF Form 1530, Punch Card Transcript, exactly as described below.

A4.6.1. (Added-AFMC) Program A/C MDS. Enter in columns 1 through 7.

|----------Status Prefix

||----------Modified Mission

|||----------Mission*

|||||------|----------Design**

Data|||||------|----------Series

Columns1234567

Example: NKC135B

* Always enter in column 3.

** Always enter in columns 4-6. Insert zeros when required.

A4.6.2. (Added-AFMC) Engine TMSM. Enter in columns 8 through 19.

CARD||----------Config ID

COLUMNS||||----------Model

||||||----------Type

|||||||----------Manufacturer

||||||||| | | Series

COLUMNS8910111213141516171819

Example:TF34GE100A

A4.6.3. (Added-AFMC) A/C MDS. Enter the aircraft MDS in the following manner in columns 20 through 25:

|----------Modified Mission

||----------Mission*

|||----------|----------|----------Design**

||||||------Series

||||||

||||||

Card Columns202122232425

Example:C141A

*Always enter in column 21.

**Always enter in columns 22-25. Insert zeros where required.

A4.7. (Added-AFMC) Number of Engines/Quantity per Application (QPA) (K008EN). Enter the number of installed engines per MDS in AF Form 1530, column 27.

A4.8. (Added-AFMC) Column Entry of Three Digit, Engine Percentages (K008EN). Enter the three digit engine percentages for 16 quarters in columns 28 through 75. If any quarter repeats on out through the sixteenth quarter, to save time, enter an "R" in the first position of the quarter repeated.

A4.9. (Added-AFMC) Action Codes (K008EN). Five action codes are available on the Engine Factor Master file. Enter one of these action codes in columns 79 and 80. Leave column 79 blank for a single digit action code. The action codes are:

- A - Adds a single transaction to the Engine Factor Master.
- PA - Adds several transactions that are pre-numbered to the Engine Factor Master.
- C - Changes the data by overlaying the old record on the Engine Factor Master.
- D - Deletes a single matching record from the Engine Factor Master.
- PD - Delete matching records from the Engine Factor Master.

A4.9.1. (Added-AFMC) In order to change the MDS/TMSM data fields, enter both an “A” and a “D” transaction. A single “C” change transaction will not work in the system. A “C” transaction is only for changing the application percents in the data fields.

A4.10. (Added-AFMC) Engine Data for Review (K008EN). Provides two data reports. One report is prepared upon receipt of the USAF PA program tape. The other report is prepared while processing the engine data. A brief description of each report follows:

A4.10.1. (Added-AFMC) Section IV - USAF PA vs Engine Factors (Q-K008-Q9X-QT-MQ9) Report. Matches the Engine Factor Master file and the new USAF PA program tape during the quarterly comparison process. It lists those MDSs on one file that are not on the other. The differences are identified by: (1) On USAF PA but not on Engine Factors and (2) On Engine Factors but not on USAF PA. Determine if the MDS/TMSMs should be added, deleted or changed. Prepare transactions for inclusion with the regular K008EN engine process.

A4.10.2. (Added-AFMC) Engine Data for Review Report. This three section report is produced during the K008EN engine process.

A4.10.2.1. (Added-AFMC) Section I-Engine Factor Change Errors (Q-K008-E6X-EN- ME6). Shows errors detected during the editing of changes. An error code legend is at the end of this section.

A4.10.2.2. (Added-AFMC) Section II-Engine Table vs PA (Q-K008-E6X-EN-ME6). Contains program MDSs that are unmatched or contain all zeros in the data fields. Each record is annotated with one of the following messages: (a) PA unmatched to table; (b) Table unmatched to PA; and (c) Zero Data.

A4.10.2.3. (Added-AFMC) Section III-Zero Engine Programs (Q-K008-E6X-EN-ME6). Shows Engine Factor records, that due to shifting of data, are now all zeros in the data fields.

A4.11. (Added-AFMC) K008EN Report Distribution. Distribute one copy each to OC-ALC/LPASA, SA-ALC/LPRW/LPFD/LPE/LR. Distribute two copies to OC-ALC/LPMF. Distribute one 9-track tape of K008EN data file to SA-ALC/LPFD and OC-ALC/LPASA.

A4.12. (Added-AFMC) Method to Determine Percentage Factors.

A4.12.1. (Added-AFMC) Get the total number of a MDS from the latest PA-series document available by quarter.

Example. PA 92-X lists 1250 F-16C aircraft in the USAF inventory for a specific quarter of a fiscal year. Repeat for each quarter for all FYs.

A4.12.2. (Added-AFMC) Identify the different TMS engines installed. The following illustrates the different MDS/TMS combinations for the F-16C aircraft.

A4.12.2. (Added-AFMC) Table A4.1. MDS/TMS Combinations.

MDS/TMS COMBINATIONS	ENGINE TMS	NUMBER AIRCRAFT
F -16C	F100PW200	650
F - 16C	F100PW220	110
F - 16C	F100PW229	25
F - 16C	F110GE100	400
F - 16C	F110GE129	65
TOTAL		1250

Example. An MDC with Multiple TMS Engines Installed.

A4.12.3. (Added-AFMC) By quarter, for each of the 38 quarters, divide the number of aircraft (MDS) that have a particular TMS engine installed by the total number of aircraft (MDS). For K008EN obtain the percentage for that engine before entering on the AF Form 1530.

A4.12.3.1. (Added-AFMC) For D041, leave in decimal format as illustrated below:

A4.12.3.1. (Added-AFMC) Table A4.2. D041.

TMS Number	Ratio	D041
F100PW200	650/1250	.52
F100PW220	110/1250	.09
F100PW229	25/1250	.02
F110GE100	400/1250	.32
F110GE129	65/1250	.05
ALL TMS	1250/1250	1.00

A4.12.3.2. (Added-AFMC) For K008 do the following:

A4.12.3.2. (Added-AFMC) Table A4.3. Applications.

TMS	MDS	Config I.D	Percent Application
F100PW200	F16		100
F100PW220	F16	PS	100
	F15	PU	100

A4.12.4. (Added-AFMC) Consider engine modification programs which will result in a configuration change when developing percentages. The PGM actuarial staff determines the percentages.

A4.13. (Added-AFMC) Method to Determine Retention. A Retention Factor based on engine operating factors is required to develop the Retention Program. The Retention Program is used to retain Investment Spares already in the system and provide support beyond the 26th quarter. Obtain the Retention Factor by calculating the application percentage for the 26th quarter forecast inventory in the PA for the TMS identified.

Attachment 5 (Added-AFMC)

PROCEDURES FOR COMPUTING D041 ENGINE OVERHAUL INPUT REQUIREMENTS

A5.1. (Added-AFMC) The engine overhaul output requirements listed on AFMC Form 538, Engine/ Overhaul Requirement Computations Part II, are to be converted to input requirements for input in the D041 Item Requirements Computation System as engine overhaul programs, Type 6 program data.

A5.2. (Added-AFMC) There are two options for computing the input requirement.

A5.2.1. (Added-AFMC) Quarterly Based Conversion Option:

A5.2.1.1. (Added-AFMC) Starting with the second quarter, divide the "output" requirement by 90 days and multiply that result by the Negotiated (depot) In-Work Time Peace (NITP) days to obtain the carry back quantity. Use the same NITP days as reported on the Engine Maintenance Status Report, RCS: MTC-LG (Q) 7312.

A5.2.1.2. (Added-AFMC) Reduce that quarter's output by the carry back quantity to obtain the initial quantity.

A5.2.1.3. (Added-AFMC) To this initial quantity add the carry back of the following quarter to obtain the total input requirement for that quarter.

A5.2.1.4. (Added-AFMC) Continue this process until data has been accumulated to meet the D041 file maintenance requirement for Type 6 program data, engine overhaul program.

A5.2.2. (Added-AFMC) Annual Based Conversion Option.

A5.2.2.1. (Added-AFMC) Take the annual fiscal year output requirement from AFMC Form 538. Divide this figure by 360 days.

A5.2.2.2. (Added-AFMC) Multiply the result times the NITP. Compute each year of requirement shifting the requirement by the NITP.

A5.2.2.3. (Added-AFMC) Include all Air Force and additive requirements in the engine overhaul programs. Include Additive Non-USAF Foreign Output Requirements (ANFO), Grant Aid (GA), and FMS

engine overhaul quantities covered by current Record Control Numbers (RCNs) or cases and Additive Non-USAF US Output Requirements (ANUO).

A5.2.3. (Added-AFMC) Document as appropriate, which quarterly D041 cycle computation is applicable. Enter the following statement: Line 12A or 13A overhaul output requirements were converted to input requirements for the engine overhaul programs (Type 6 program data) to the quarterly D041 Item Requirements Computation.

A5.2.4. (Added-AFMC) Any significant program changes that occur in between computation cycles will be used to update the D041 engine overhaul programs. If timing is not feasible for input to the D041 OLRRS, provide the changes to the applicable component Product Group Managers for manual update to support item requirements.

Attachment 6 (Added-AFMC)

ENGINE ACQUISITION BUDGET DOCUMENTATION

A6.1. (Added-AFMC) General: The basic document, Aircraft Initial Spares Requirement Format (AISRF), for programming funds for the Biannual Planning, Programming and Budgeting System (BPPBS) for propulsion engines, auxiliary power unit (APU), and QEC kit requirements will be provided by HQ AFMC/FMRS through the servicing Center’s FM organization. Use this AISRF to document requirements and program funds for the Budget Estimate Submission (BES), Amended Budget Estimate Submission (ABES), and to establish the baseline for the POM.

A6.2. (Added-AFMC) Documentation Required: Format all budget requests for propulsion engine, APU, QEC kit and non-stocklisted modules requirements for BES, ABES, President's Budget (PB) update, POM, out of cycle requests for new funds, or the realignment of existing funds as shown in paragraph C.

A6.3. (Added-AFMC) Procedure:

A6.3.1. (Added-AFMC) The PGM or the weapon SPD responsible for computing the propulsion system requirements completes the AISRF documentation requirements.

A6.3.1.1. (Added-AFMC) Engine supported by the Air Force.

A6.3.1.1.1. (Added-AFMC) Acquisition Engines: Complete the AISRF and required documentation. Forward the AISRF along with other system initial spares requirements, as applicable, to the Center's FM organization. The Center's FM organization consolidates the center's budget and sends it to HQ AFMC/FMRS.

A6.3.1.1.2. (Added-AFMC) Responsibilities:

A6.3.1.1.2.1. (Added-AFMC) If the SPD computes the spare engine requirement, the AISRF shall be sent to the PGM for coordination. The PGM returns the AISRF and required documentation back to the SPD for inclusion with the initial spares budget (BP16/26). After SPD review and comment, the AISRF is forwarded to HQ AFMC/FMRS through the Center's FM organization.

A6.3.1.1.2.2. (Added-AFMC) If the PGM computes the requirement, forward the completed AISRF and required documentation to the SPD for coordination and inclusion with the initial spares budget (BP16/26). The SPD forwards it to HQ AFMC/FMRS through the Center's FM organization.

A6.3.1.2. (Added-AFMC) Quick Engine Change (QEC) Kits: QEC Kit management is generally with the SPD. Upon receipt of the final spare engine requirement (AISRF) the PGM shall then determine the required number of QEC Kits, and document the QEC Kit requirement on the AISRF. The SPD shall then consolidate the QEC Kit requirement with the other weapon system initial spares budget requirements (BP16/26) and forward to HQ AFMC/FMRS through the Center's FM organization.

A6.3.1.3. (Added-AFMC) APUs: APU requirements are computed separately from the primary engines and may or may not have a QEC Kit requirement. The responsible PGM computes the requirement as an Initial Spare and documents APU and any APU QEC Kit requirements on the AISRF and forwards the requirement and supporting documentation to SA-ALC/LD for review and comment. After review, SA-ALC/LD returns the APU requirement to the PGM for inclusion in the initial spares budget (BP16/ 26). The AISRF is then forwarded to HQ AFMC/FMRS through the Center's FM organization.

A6.3.2. (Added-AFMC) Contract Logistics Supported (CLS) Aircraft: The CLS aircraft SPD follows the procedures in paragraph 3.1. above when the Air Force: a). owns the spare engines, b). QEC kits, c). APUs, d). owns title to a specific number of spares, e). must provide spare engines as Government Furnished Equipment (GFE), or f). the engine spares are required as part of a government developed recompetition package. Budget all engine spares not covered above as part of the CLS cost.

A6.3.3. (Added-AFMC) Special Operations Forces (SOF): Budget SOF engine spares requirements through WR-ALC/LU and HQ AFSOC. Documentation requirements are the same as outlined above except that it is forwarded to USSOCOM's FM organization.